

# SSL PRODUCT QUALITY ASSURANCE

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Fred Welsh  
Radcliffe Advisors

# “I know it when I see it....”

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- Successful SSL market introduction depends on quality products
- The CFL experience illustrates the problems we do not wish to repeat
- Quality is broader than performance
  - Relates to reliability, robustness, uniformity, and other things hard to define, but ....
  - You know it when you see it!

# The CFL Experience

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- Technology Problems:
  - Poor color quality resulted in early removals
  - Low light: 27-watt CFLs were not seen as equivalent to a 100-watt incandescent as claimed
  - Early bulb burnouts were a major problem
- There were many marketing issues as well

*CFLs were introduced in the 1970s, but had only a 2% market share in the US by 2006*

*Compact Fluorescent Lighting in America: Lessons Learned on the Way to Market,*  
June 2006, [www.netl.doe.gov/ssl/072806.html](http://www.netl.doe.gov/ssl/072806.html)

# CFL Lessons Learned

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- Be aggressive about dealing with technology failures that affect main benefit claims
- Know and admit technology limitations
- Establish minimum performance requirements

*“Early consumer experience with fluorescent lamps and CFLs still defines attitudes towards CFLs, even though the technology has greatly improved since its introduction.”*

[www.netl.doe.gov/ssl/072806.html](http://www.netl.doe.gov/ssl/072806.html)

# Similar Problems with LEDs

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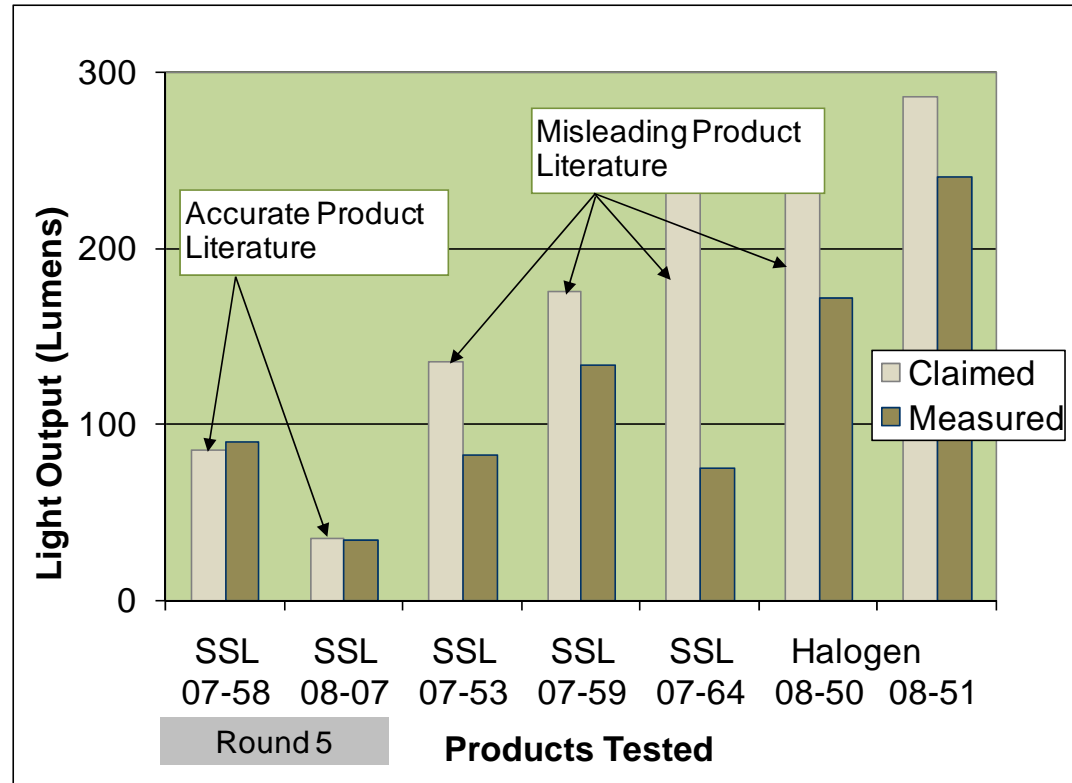
*Although many, perhaps most, LED products are reasonably good, there are some spoilers...*

- Low light output is quite common (vs. claim)
- Disappointing lifetimes
  - Early failures, not typical lumen depreciation
  - Excessive claims of longevity (“forever”)
- Poor or inconsistent color quality
  - “White” light with CCT over 12000K!
  - High variability among samples of same product

# Low Light Output

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Results of CALiPER tests of MR16 replacement lamps. These are not all bad products, but the claims are misleading. Note that even halogens may have lower than claimed light output.

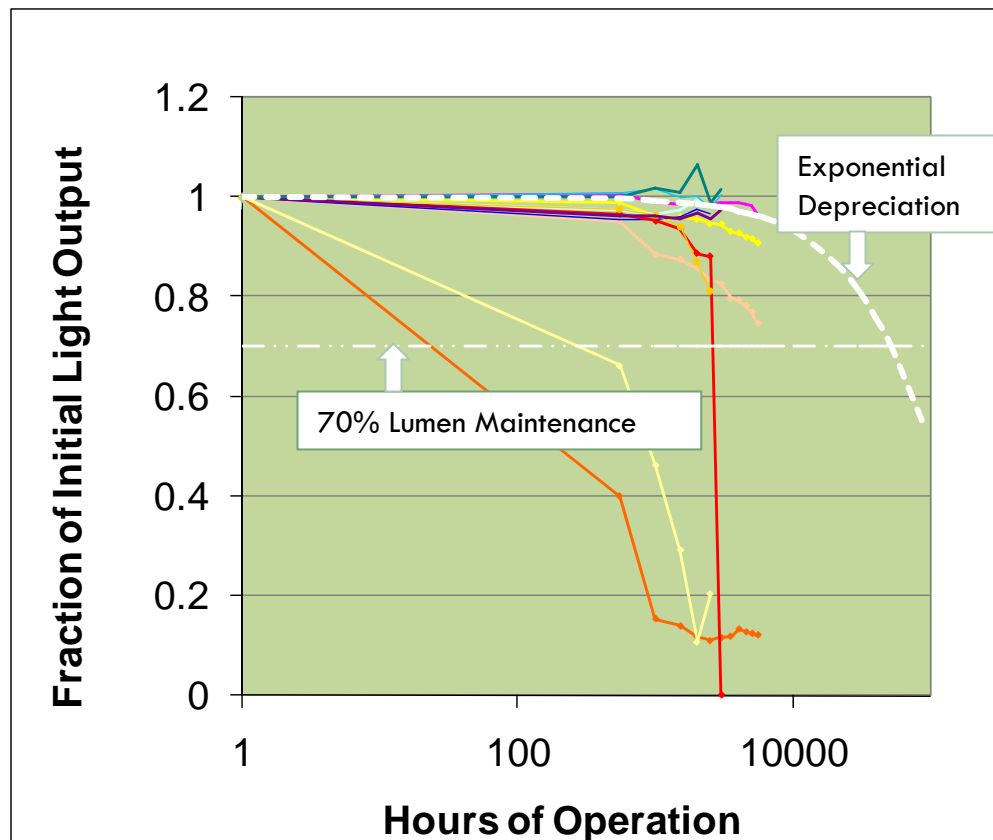


[http://www.netl.doe.gov/ssl/comm\\_testing.htm](http://www.netl.doe.gov/ssl/comm_testing.htm)

# Examples of Early LED Failures

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Lumen maintenance testing by CALiPER. The white curve is expected lumen depreciation for a 50Khr lifetime, 70% lumen maintenance.



[http://www.netl.doe.gov/ssl/comm\\_testing.htm](http://www.netl.doe.gov/ssl/comm_testing.htm)

# Product Quality Assurance

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- A joint NGLIA/DOE PQA team is studying the quality issues for SSL
- Initial findings:
  - False or mistaken claims have already disappointed customers
  - Luminaire efficacy concept not well-understood
  - Must seek accurate reporting of key parameters
  - Manufacturers should report performance using LM-79 and other standards
- The rest of the value chain must support the effort to achieve the desired goals



# A Call for *SSL Quality Advocates*

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- The PQA team has:
  - Identified critical parameters for luminaires
  - Published an educational brochure for luminaires
  - Established a Lighting Facts™ label
- *SSL Quality Advocates\** will
  - Pledge to support objectives for SSL quality
  - Use the label, or ask for it
  - Continue to work on quality improvement

*\* Program under development*

# Luminaire Recommendations

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Five critical parameters for luminaires:

- ✓ Lumens
- ✓ Efficacy
- ✓ Input power
- ✓ CCT
- ✓ CRI

## REPORTING LED LUMINAIRE PRODUCT PERFORMANCE

An Initiative for  
Better Solid State Lighting

Next Generation Lighting Industry Alliance  
with the  
U. S. Department of Energy



July 2008

## Lighting Facts™

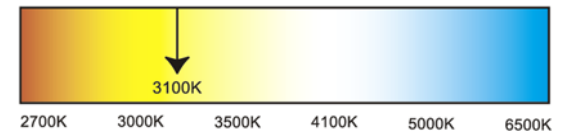
Solid State Lighting Luminaire

<b>Lumens</b>	840 lm
Lumens per Watt	93 lpw

<b>Watts at 120VAC</b>	9W
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### Color

Correlated Color Temperature (CCT)	3100K
Color Rendering Index (CRI, R <sub>a</sub> )	87



Efficacy and lumen output are reported according to IESNA LM-79-2008

# The Effort will be Ongoing

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- Develop Parallel critical parameters and brochure for light sources
- Consider other quality metrics
  - Reliability and lifetime – not just lumen depreciation
  - Tighter tolerances on color specs
  - Interfaces, construction quality
  - Environmental tolerances
  - Etc.

# Credits

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## □ NGLIA Product Quality Team

Jianzhong Jiao, Osram-OS

Ralph Tuttle, Cree

Paul Phillips, LSI-INDUSTRIES

Srinath Aanegola, GE

Jeff Quinlan,

Acuity Brands

Kevin Dowling, Philips

## □ And Others...

Mia Paget, PNNL

Linda Sandahl, PNNL

Callie Ward, FTC

Brinda Thomas,

Navigant Consulting

Diana Burk

Navigant Consulting